



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/522,226      | 01/24/2005  | Takeaki Itsuji       | 03500.017686        | 7189             |
| 5514            | 7590        | 10/31/2005           |                     | EXAMINER         |
|                 |             |                      |                     | BLEVINS, JERRY M |
|                 |             |                      | ART UNIT            | PAPER NUMBER     |
|                 |             |                      |                     | 2883             |

DATE MAILED: 10/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                                         |                         |
|------------------------------|-----------------------------------------|-------------------------|
| <b>Office Action Summary</b> | <b>Application No.</b>                  | <b>Applicant(s)</b>     |
|                              | 10/522,226                              | ITSUJI ET AL.           |
|                              | <b>Examiner</b><br>Jerry Martin Blevins | <b>Art Unit</b><br>2883 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 24 January 2005.  
 2a) This action is FINAL.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-17 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-17 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 24 January 2005 is/are: a) accepted or b) objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
     1. Certified copies of the priority documents have been received.  
     2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
     3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |                                                                                                                                                          |                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                                                              | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                                                     | Paper No(s)/Mail Date: _____                                                |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>1/24/2005; 8/8/2005</u> . | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|                                                                                                                                                          | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-17 are rejected under 35 U.S.C. 102(b) as being anticipated by US Pre Grant Publication to Cotteverte et al., number 2002/0048422.

Regarding claim 1, Cotteverte teaches an optical element (Figures 14-19) for reflecting or transmitting an incident light (waveguide 110), the optical element comprising a periodic structure (photonic crystal 100 with periodic columns 108) in which refractive index is distributed periodically (paragraph 13, page 2) and a deforming portion (Figure 15 shows deformation  $D+\Delta d$  in the periodicity of columns 108) which deforms by external action (Figure 16, voltage 122 or Figure 17, actuator 134), wherein the deforming portion is integrally arranged with the periodic structure along the periodic direction of the periodic structure (Figure 15), and is so constructed as to change the periodicity of the periodic structure by deforming in the periodic direction of the periodic structure (pages 4 and 5, paragraphs 59-67).

Regarding claim 2, Cotteverte teaches the limitations of the base claim 1. Cotteverte also teaches that the change in the periodicity is that in any one of period,

phase, duty and orientation of the periodic structure or in the combination thereof (Figure 15 and pages 4 and 5, paragraphs 59-67).

Regarding claim 3, Cotteverte teaches the limitations of the base claim 1. Cotteverte also teaches that the deforming portion is positioned outside a path of reflecting or transmitting light (waveguide 110) of the optical element (Figure 15).

Regarding claim 4, Cotteverte teaches the limitations of the base claim 1. Cotteverte also teaches that the deforming portion includes a member (columns 108) integrally joined to the periodic structure, and that the member deforms in the direction parallel to the joining plane of the member with the periodic structure (Figure 15).

Regarding claim 5, Cotteverte teaches the limitations of the base claim 1. Cotteverte also teaches that the deforming portion includes a member (columns 108) for supporting the periodic structure, and the member deforms in the direction parallel to the plane of the member supporting the periodic structure (Figure 15 and pages 4 and 5, paragraph 61).

Regarding claim 6, Cotteverte teaches the limitations of the base claim 5. Cotteverte also teaches that the member supporting the periodic structure is the same as a member constituting the periodic structure (columns 108).

Regarding claim 7, Cotteverte teaches the limitations of the base claim 1. Cotteverte also teaches that the deforming portion elongates and contracts in at least one direction (Figure 15 and pages 4 and 5, paragraphs 61-67).

Regarding claim 8, Cotteverte teaches the limitations of the base claim 1.

Cotteverte also teaches that the deforming portion causes shear deformation in at least one direction (pages 4 and 5, paragraph 61).

Regarding claim 9, Cotteverte teaches the limitations of the base claim 1.

Cotteverte also teaches that the deforming portion is constituted of a piezoelectric element (substrate 120 and voltage supply 122, Figure 16 and pages 5 and 6, paragraphs 64-72).

Regarding claim 10, Cotteverte teaches the limitations of the base claim 9.

Cotteverte also teaches that the deforming portion includes a pair of electrodes (Figure 16, denoted by connection lines from voltage supply 122), and the pair of electrodes are so arranged as to provide the deforming portion with an electric field substantially parallel to the periodic direction of the periodic structure (page 5, paragraph 64).

Regarding claim 11, Cotteverte teaches the limitations of the base claim 9.

Cotteverte also teaches that the deforming portion includes a pair of electrodes (Figure 16, denoted by connection lines from voltage supply 122), and the pair of electrodes are so arranged as to provide the deforming portion with an electric field substantially perpendicular to the periodic direction of the periodic structure (page 8, paragraph 92).

Regarding claim 12, Cotteverte teaches the limitations of the base claim 1.

Cotteverte also teaches that that the periodic structure is of a multi-dimensional photonic crystal (page 4, paragraph 59).

Regarding claim 13, Cotteverte teaches the limitations of the base claim 12.

Cotteverte also teaches that the periodic structure is of a two-dimensional photonic

crystal (page 4, paragraph 59 and Figures 14-16), and is composed of a portion having a two-dimensional periodicity (including periodic arrangement of columns 108) and a support portion (Figures 14 and 15, element 112 or Figure 16, element 120) for supporting the portion having the two-dimensional periodicity.

Regarding claim 14, Cotteverte teaches the limitations of the base claim 12. Cotteverte also teaches that the periodic structure is of a two-dimensional photonic crystal (page 4, paragraph 59), and is composed solely of a portion having a two-dimensional periodicity (Figures 1, 2, 5, 10, and 12).

Regarding claim 15, Cotteverte teaches a mirror comprising the optical element according to claim 1, and means for switching reflective and transmissive properties of the periodic structure alternatively by providing the deforming portion of the optical element with external force (Figures 18 and 19 and page 5, paragraphs 67 and 68).

Regarding claim 16, Cotteverte teaches an optical deflector comprising the optical element according to claim 1, and means for changing a light-propagating direction of the periodic structure by providing the deforming portion of the optical element with external force (Figures 18 and 19 and page 5, paragraphs 67 and 68).

Regarding claim 17, Cotteverte teaches a control method for an optical element having a periodic structure in which the refractive index is distributed periodically (paragraph 13, page 2), comprising the steps of arranging a deforming portion (Figure 15 shows deformation  $D+\Delta d$  in the periodicity of columns 108) which deforms by external action (Figure 16, voltage 122 or Figure 17, actuator 134) integrally with the periodic structure (photonic crystal 100 with periodic columns 108) along the periodic

direction of the periodic structure (Figure 15), and changing the periodicity of the periodic structure by causing deformation in the periodic direction of the periodic structure (pages 4 and 5, paragraphs 61-64).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jerry Martin Blevins whose telephone number is 571-272-8581. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on 571-272-2415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Frank G. Font  
Supervisory Patent Examiner  
Technology Center 2800

JMB